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Salmonellosis Outbreak and Peanut Butter

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A recent MMWR publication summarized a national outbreak of salmonellosis associated with peanut products. This outbreak investigation identified an unusual source of exposure as well as highlighted the challenge of managing a large diffuse outbreak.

Outbreak Investigation

At the end of November, 2008, the PulseNet project with the Centers for Disease Control and Prevention (CDC) identified a national cluster of *Salmonella enterica* serovar Typhimurium. The isolates shared an unusual pulsed-field gel electrophoresis (PFGE) pattern.

The shared PFGE pattern suggested a common source of exposure. A series of case-control studies were done to identify the source of exposure. Initial interviews conducted by Minnesota Department of Health identified cases in two long-term care facilities and in an elementary school. The only common food used by these institutions was a specific brand of peanut butter. An open container of the peanut butter tested positive for the outbreak strain of *S.* Typhimurium. Based on this report a national case-control study was done during the first week in January 2009 which implicated both peanut butter and any form of frozen chicken products. Additional institutional clusters were identified and an unopened container of the same peanut butter brand was culture positive for *Salmonella*.

Further investigation identified patients who did not eat peanut butter but did eat other products containing peanut butter (or the commercial ingredient of peanut paste used in items such as crackers and cookies). A second national case-control study implicated two brands of pre-packaged peanut butter crackers made in a single plant. Unopened packages of these crackers tested positive for the outbreak strain of *Salmonella*. The peanut butter and peanut paste used to make the crackers came from a single peanut processing facility.

As of February 17th, 2009, there were 642 cases from 44 states identified in the outbreak (see Figure below). Of these case patients 116 (23%) were hospitalized and there were nine associated deaths. Median age was 16 years (range <1 to 98 years) with 21% age under five years and 17% aged over 59 years.

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In Washington, 19 salmonellosis cases with PFGE patterns matching the outbreak strain have been identified with three hospitalizations. These cases were scattered throughout 15 Washington counties. All Washington cases have been interviewed and their exposure information combined with that from other states to help describe the scope of products that may be affected. The only recalled food item reported by multiple cases in Washington was peanut butter crackers.

A previous salmonellosis outbreak attributed to contaminated peanut butter in the United States in 2006-2007 was associated with *S.* Tennessee contamination of national brands of jarred peanut butter sold directly to consumers. In 1995, Australia reported the only other known salmonellosis outbreak associated with peanut butter.

Product Trace-Back

Production at the peanut processing plant stopped on January 9th and food recalls began the following day. Products from the source facility had been sold to institutions and to other manufacturers rather than directly to the public. In addition to peanut butter, the recall was eventually expanded to include all peanuts and peanut products from the plant including roasted peanuts, peanut butter and paste, granulated peanuts, and peanut meal.

Trace-back has been complicated by the numerous manufacturers using the peanut products as ingredients. Thousands of products containing peanut butter have recalled by hundreds of companies. Recalled products were sold under numerous brands and included cookies, crackers, cakes, pies, donuts, candy, ice cream, vegetables or apples packed with peanut butter dip, pre-packaged meals, snack bars, snack mixes, and pet treats.

Further investigation at the facility has been directed at identifying the source of contamination and the presence of bacteria after peanuts went through a roasting step. If not eliminated by temperature or if re-introduced into roasted peanut products, *Salmonella* can persist for extended periods in foods which are high in fat and low in water.

Ongoing advice to consumers is to avoid the implicated products. Consumers should:

- Discard any recalled product
- Avoid products containing peanut butter if recall status is unsure
- Avoid handling recalled pet products

Perspective on the Outbreak

CDC estimates only 3% of infections with *Salmonella* are laboratory confirmed, suggesting that the outbreak is much larger. Rates of hospitalization and death in this outbreak are typical for salmonellosis even though long term care facilities serving elderly clients have populations particularly vulnerable to severe infections.

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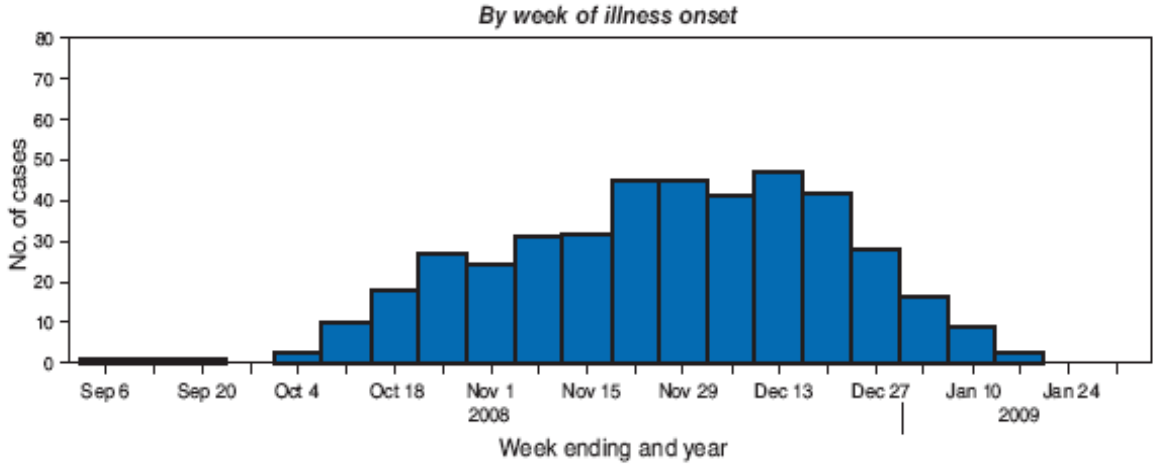
Although *S.* Typhimurium is among the most common *Salmonella* serotypes, this particular strain is rare. Molecular testing first identified the outbreak, emphasizing the importance of laboratory submission of isolates to public health reference laboratories for strain typing.

This outbreak is one of several recent large national investigations that have emphasized the challenges of such efforts. When an ingredient rather than a specific brand or consumer product is implicated in an outbreak, multiple interviews may be necessary to identify the source of exposure. Even a carefully designed case-control study may identify more than one source; in this investigation, frozen chicken was also implicated by the case-control study. Frozen chicken as a category includes many different types and sources of chicken. Simply achieving statistical significance for such food types in a case-control study does not necessarily implicate that product. Recovery of suspect foods consumed by patients and product trace-back are important tools needed to definitively identify a source of contamination. Trace-back in these situations has been complicated because a common ingredient such as peanut paste may enter many diverse products. Finally, the scale of modern food production with subsequent mass distribution can make the exposures diffuse and more difficult to recognize.

Identifying the source of exposure for this large national outbreak required detailed case interviews, cluster investigations, and national coordination of investigations. Sequential case-control studies and product testing together identified the exposure source. We appreciate the efforts of local health jurisdictions in contacting and interviewing the case patients for this investigation.

Figure. Number of laboratory-confirmed cases (N=529) of *Salmonella* Typhimurium of the outbreak strain as of January 29th, 2009 (See MMWR)



For the full article see:
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm58e0129a1.htm

For a list of recalled products in Washington see:
http://www.doh.wa.gov/ehp/food/salmonellaoutbreak.html

For a national list of recalled products see:
http://www.fda.gov/oc/opacom/hottopics/salmonellatyph.html